

**SOUTHWEST ALASKA
TRANSPORTATION PLAN**

**TRAVEL DEMAND FORECASTS
TECHNICAL MEMORANDUM**

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INTRODUCTION AND BACKGROUND

The purpose of this Technical Memorandum is to document the development of travel demand forecasts for the Southwest Alaska study area for the years 2010 and 2020. Travel demand forecasts are developed by mode: large and small certificated air carriers, freight, highways, and the Alaska Marine Highway System (AMHS). The primary objective in developing multi-modal travel forecasts for Southwest Alaska is to have an objective and reliable basis upon which to evaluate potential transportation investments. To forecast travel for communities within the Southwest Alaska study area for the year 2020, travel demand models were developed. These models forecast travel as a function of a number of variables, including population, salary and wage employment per person, average per capita income, and current travel patterns. The following sections describe the forecasting methodology and process used; the population, income, and employment forecasts that were used in the travel forecasting models; and the low, base, and high forecasts for air passenger travel, freight demand, highway travel, and AMHS travel.

FORECASTING METHODOLOGY AND PROCESS

Two important aspects of travel demand forecasting include the collection of data, and the specification and application of the model.

Data Collection

The first step in the development of travel demand forecasting models for the Southwest Alaska region is to collect appropriate available data. As part of developing the *Southwest Alaska Transportation Plan Existing Conditions Technical Memorandum*, the study team obtained data regarding passenger and cargo travel at airports in the region, highway travel, and travel on the Alaska Marine Highway System (AMHS). As will be described in more detail later in this report, data was also collected on population, income, and employment in the Southwest Alaska region. This data was used to develop travel demand forecasts for air travel, freight movement, highway travel, and AMHS travel.

Model Specification and Application

Some of the models developed (i.e., those for forecasts of enplanements and travel on the Alaska Marine Highway System) were based on origin-destination pairs (O-D pairs). As will be described in more detail later in this report, forecasts were made on trip ends rather than O-D pairs. Once trip ends were forecast, these trip ends were allocated to O-D pairs. The trip ends were allocated to O-D pairs by assuming in the first iteration that the proportion of trip ends to each other community currently and in the future will remain constant. However, because different communities will experience different rates of growth, the forecasts adjusted total trip ends to communities based on this growth. Therefore, the proportion of trip ends to other communities in the future will differ from current conditions. The initial allocation, then, was adjusted iteratively until the allocation of trips was such that total trip ends at a given community was equal or nearly equal (usually within 1 percent) to the forecast total trip ends.

A number of factors can influence current and future travel demand. Based upon transportation theory and experience, it was decided that several of the most important variables that should

be included in any model estimating demand for travel include population, employment, and income. Although existing and future population forecasts were available at the community level, data on income and employment were only available at the borough level. Therefore, for the purpose of this task all communities within a given borough were assigned the same average per capita income and per capita employment.

Models to forecast travel demand were developed using regression analysis techniques. Regression analysis techniques use information about one variable to obtain information about another variable. In the case of the travel demand models for Southwest Alaska, information about income, population, and employment were used to obtain information about travel behavior. The regression analysis determines the relationship between current travel behavior in communities, and current population, income, and employment on a community or borough-level basis. The relationship between these variables becomes the regression “model.” This model is then applied to 2010 and 2020 forecasts of population, employment, and income to predict future travel behavior.

The strength of the models tested were compared based on the coefficient of determination (the R^2 coefficient). The R^2 coefficient, which varies between 0 and 1.0, helps to explain how well the model fits. In general, the higher the R^2 coefficient, the better the fit of the model. Another way of thinking about the R^2 coefficient is that it represents the proportion of the variation in the dependent variable (for example, passenger trips on airlines) which can be “explained” by the model. So, for example, an R^2 coefficient of 0.60 indicates that about 60 percent of the variation in the predicted passenger trip values can be explained by the values of the variables included in the model.

A number of different possible model specifications were assessed to determine which model indicated the strongest relationship between the independent variables (population, income, and employment) and the dependent variables (passenger trips, cargo trips, etc.). It should be pointed out that population, employment, and income are not entirely independent of one another. For example, the number of jobs per population does have some relationship to income. However, a correlation analysis indicated that these variables are sufficiently independent from one another to allow their use in the model development. Of the three independent variables (population, employment, and income) only the variable population provided existing data and forecasts at the community level. Therefore, it was decided in advance that population should be one of the variables included in each of the final models developed.

To help improve the accuracy of the models, forecast trips were adjusted based on how well the model predicted current trips. Trips “forecast” by the model for the existing year based on current conditions were compared to the actual number of trips that occurred. The difference between trips “forecast” by the model for the existing year and the actual number of trips that occurred was attributed to factors not captured in the model (either unknown factors or factors for which data was unavailable). These differences or errors are not considered random, so the error “rate” for a given community was assumed to be constant for the future year forecasts. Therefore, the ratio between existing year trips “forecast” and the actual number of trips that occurred were then applied to future forecasts. For instance, if the model indicated that 100 trips would occur in a given community based on existing conditions, and we know that actually 110 trips occurred, we adjusted the future forecasts accordingly. So, if the 2020 forecast indicated that 200 trips occurred, the 2020 forecast was adjusted according to the difference

between the model and actual results. Therefore, 200 was multiplied by 110 trips/100 trips and the forecast was adjusted to 220 trips instead of 200 trips.

POPULATION, INCOME, AND EMPLOYMENT FORECASTS

Population, income, and employment forecasts for the Southwest Alaska region for the years 2010 and 2020 were developed by Dr. Scott Goldsmith, Institute of Social and Economic Research (ISER), at the University of Alaska in Anchorage.¹ These models were developed based on a set of assumptions about future basic industry activity within Alaska, and national and state economic and policy variables. The forecasts included low, base, and high scenarios. The high and low forecasts do not represent the highest *possible* outcomes for future scenarios. Instead, they represent combinations of scenario elements that yield projections near the upper and lower bounds of likely outcomes. So actual population, employment, or income growth could theoretically be higher or lower than the forecasts indicate.

The ISER forecasts were developed at the Borough and Census Area level. Future populations at the community level were then projected by Northern Economics based on the trend in each community over recent years, and an assumption that recent trends would continue logarithmically into the future. The assumption of logarithmic growth (or decline) produces less change over time than if a simple linear trend is used, and prevents populations in decline from going into negative numbers. Projected community populations within each borough or census area were adjusted proportionally to sum to the borough or census area level projections. Population, income, and employment forecasts are presented in Tables 1 through 3.

¹ For a complete description of the methodology used to forecast population, employment and income, see "Economic Projections for Southwest Alaska - Economic Projection Methodology," by Dr. Scott Goldsmith, ISER, University of Alaska, Anchorage, January, 1998. Submitted to the State of Alaska, Statewide Planning Division, DOT&PF.

TABLE 1
CURRENT POPULATION AND 2010 AND 2020 FORECASTS

Borough	Community	Current*	2010			2020		
			Low	Base	High	Low	Base	High
Aleutians East Borough	Akutan	448	329	365	406	299	359	403
	Cold Bay	129	60	67	74	47	57	64
	False Pass	69	67	74	82	66	79	89
	King Cove	666	718	797	886	712	856	961
	Nelson Lagoon	80	88	98	109	88	106	119
	Sand Point	795	820	910	1,012	802	964	1,082
	Total	2,186	2,083	2,311	2,569	2,013	2,420	2,718
Aleutians West Census Area	Atka	96	100	111	124	94	113	128
	Nikolski	33	28	31	34	25	30	34
	Saint George	149	154	170	189	146	175	197
	Saint Paul	674	715	790	879	669	802	903
	Unalaska	3,626	4,411	4,879	5,428	4,295	5,148	5,798
	Total	4,578	5,408	5,981	6,654	5,231	6,269	7,060
Bristol Bay Borough	King Salmon	667	574	608	686	617	688	805
	Naknek	563	615	651	734	613	684	799
	South Naknek	149	148	157	177	148	165	193
	Total	1,380	1,337	1,417	1,597	1,377	1,537	1,796
Dillingham Census Area	Aleknagik	178	168	184	201	165	194	220
	Clarks Point	65	66	72	79	67	79	89
	Dillingham	2,138	2,291	2,509	2,746	2,334	2,749	3,114
	Ekwok	113	143	157	171	151	178	202
	Koliganek	195	213	234	256	218	257	291
	Manokotak	393	398	436	477	400	471	533
	New Stuyahok	397	459	502	550	471	554	628
	Togiak	646	780	854	935	809	953	1,080
	Twin Hills	63	67	74	81	67	79	90
	Ekuik	3	2	3	3	2	3	3
	Portage Creek	5	10	11	13	11	13	15
	Total	4,195	4,597	5,034	5,511	4,697	5,531	6,266
Kodiak Island Borough	Kodiak Island Remainder	3,483	3,451	3,828	4,208	3,456	4,188	4,847
	Akhiok	84	90	99	109	91	110	127
	Chiniak	86	76	84	92	76	92	106
	Karluk	69	43	48	53	39	47	55
	Kodiak	6,833	6,886	7,639	8,397	6,907	8,371	9,687
	Kodiak Station	1,877	1,867	2,071	2,277	1,862	2,257	2,612
	Larsen Bay	146	107	119	131	100	121	140
	Old Harbor	306	305	339	372	306	371	430
	Ouzinkie	223	259	288	316	266	322	373
	Port Lions	251	229	254	279	228	276	320
	Womens Bay	674	677	751	826	680	824	954
	Total	14,031	13,990	15,520	17,060	14,010	16,980	19,650
Lake and Peninsula Borough	Chignik	155	98	107	118	85	101	114
	Chignik Lagoon	66	80	87	96	85	100	113
	Chignik Lake	139	146	160	175	150	177	200
	Egegik	127	138	151	166	142	167	189
	Igiugig	38	54	59	65	58	68	77
	Iliamna	105	106	115	127	108	128	145
	Ivanof Bay	37	25	27	30	23	27	31
	Kokhonak	155	171	187	205	176	207	235
	Levelock	112	115	126	138	118	139	157
	Newhalen	159	180	197	216	185	218	247
	Nondalton	221	258	281	309	269	317	359
	Pedro Bay	52	39	43	47	38	45	51
	Perryville	112	99	108	119	99	116	132
	Pilot Point	70	92	100	110	98	115	131
	Port Alsworth	57	66	72	79	68	81	91
	Port Heiden	127	132	144	158	134	158	179
	Ugashik	5	4	4	5	4	4	5
	Total	1,735	1,804	1,968	2,161	1,839	2,167	2,455
	Study Area Totals	28,103	29,219	32,232	35,551	29,167	34,903	39,945

*Annual average 1988 through 1995 for most communities.

TABLE 2
CURRENT AVERAGE PER CAPITA INCOME (1995 DOLLARS)
AND 2010 AND 2020 FORECASTS

Borough	Current Income*	Low 2010	Base 2010	High 2010	Low 2020	Base 2020	High 2020
Aleutians East Borough	\$20,165	\$20,476	\$21,030	\$23,166	\$19,704	\$20,902	\$23,358
Aleutians West Census Area	\$25,712	\$23,218	\$24,298	\$26,449	\$22,306	\$23,817	\$26,471
Bristol Bay Borough	\$32,563	\$35,075	\$36,620	\$38,750	\$34,058	\$37,013	\$40,556
Dillingham Census Area	\$21,878	\$21,166	\$21,893	\$23,243	\$20,719	\$21,903	\$23,930
Kodiak Island Borough	\$20,083	\$21,444	\$22,101	\$23,681	\$21,556	\$22,792	\$25,598
Lake and Peninsula Borough	\$16,217	\$16,043	\$16,667	\$17,411	\$15,707	\$16,444	\$18,039

*Average 1993 to 1995

TABLE 3
CURRENT EMPLOYMENT (IN THOUSANDS)
AND 2010 AND 2020 FORECASTS

	Current Employment*	Low 2010	Base 2010	High 2010	Low 2020	Base 2020	High 2020
Aleutians East Borough	1,500	1,540	1,730	2,020	1,460	1,790	2,130
Aleutians West Census Area	4,362	3,900	4,370	5,110	3,700	4,510	5,390
Bristol Bay Borough	1,122	1,050	1,130	1,310	1,080	1,250	1,520
Dillingham Census Area	2,001	2,050	2,240	2,580	2,080	2,460	2,980
Kodiak Island Borough	5,562	5,910	6,580	7,370	5,810	7,100	8,420
Lake and Peninsula Borough	578	610	660	760	620	730	880

*Average 1988 through 1995

TRAVEL FORECASTS

Enplanements

Air travel is the most common way that people move to and from the region, and within the region. The *Southwest Alaska Transportation Plan Existing Conditions Technical Memorandum* identified historic trends in passenger enplanements at airports in the Southwest Alaska region. Total enplanements includes enplanements by large certificated carriers and small certificated carriers.

Total enplanements were forecast for the years 2010 and 2020 for the Southwest Alaska study area. To forecast enplanements, data used included the current and future population in each community, the current number of trip ends² that occur in each community, the current and

² One trip end is assigned to each community for each trip that either begins or ends in the community.

forecast number of wage and salary jobs per person (at the Borough level), and the current and forecast average per capita income (at the Borough level).

Several adjustments were made to the data. For some communities, the population and trip ends were combined at adjacent, road-connected communities since the airports at these locations serve more than one community. The communities/airports combined include King Salmon with Naknek; Dillingham with Aleknagik; Newhalen with Iliamna; and Kodiak with Women's Bay, Chiniak, and the remaining population in the Kodiak Island Borough outside of identified communities. A few smaller communities within the Southwest Alaska area have no permanent residents so these communities were excluded from the analysis. In addition, because we know that visitor trips are increasing faster than other trips in Alaska, we separately forecast visitor enplanements.

Enplanement Forecasts (Excluding Visitor Trips)

The model that provided the best "fit" with existing conditions data (with visitor trips taken out of the data) and included the variable "population" in the model is as follows:³

$$\begin{aligned} \text{Airplane Trip Ends for a Given} & \quad (0.00483)(\text{Income}) + \\ \text{Community} = & \quad (13.69844)(\text{Population}) \\ & + (3021.09018)(\text{Jobs Per Population}) \end{aligned}$$

The R^2 coefficient for this model was 0.90726, indicating that about 91 percent of variation in enplanements at a trip end can be explained by population, jobs per population, and income. To help improve the accuracy of the model, forecast trips were adjusted as described in the Model Specification and Application section of this memorandum.

Airplane trip end forecasts using low, base, and high population, employment, and income forecasts for the years 2010 and 2020 are presented in Tables 4 and 5. As shown in Tables 4 and 5, airplane trip ends are forecast to increase for the low, base and high scenarios for most of the communities in the study area. As described previously, the model developed to forecast enplanements includes population, income, and jobs per person as variables. However, population was the most influential variable in the model so differences in enplanement forecasts can primarily be attributed to differences in population forecasts. As a percentage increase in enplanements, forecast enplanements will increase most significantly at Togiak, Unalaska, Pilot Point, Igiugig, Nikolski, Nondalton, Atka, Ekwok, Ouzinkie, Chignik Lagoon, and New Stuyahok. Population forecasts for all of these communities except Nikolski indicate higher populations in the years 2010 and 2020 in the low, base, and high scenarios. Most of these communities, however, are relatively small, so the increase in the actual number of enplanements is not necessarily very significant. Communities that are forecast to experience the greatest increase in the **number** of enplanements are Kodiak, Unalaska, and Dillingham/Aleknagik, which are also the communities that currently experience the most enplanements. Although the population and employment at Nikolski are not forecast to increase in 2010 or 2020, jobs per population are forecast to increase. Enplanements are forecast to decrease for the low, base, and high scenarios for six communities: Ivanof Bay, Karluk, Larsen Bay, Akutan, Cold Bay, and Chignik. Population forecasts for these six

³ Another variable suggested by Alaska Department of Transportation and Public Facilities for potential inclusion in the model was a variable that identified communities characterized as major activity centers. This variable was tested for potential inclusion in the model, but because it did not improve model results it was left out.

communities indicate lower populations in the years 2010 and 2020 in the low, base, and high scenarios. Appendix A presents the enplanement origin-destination pairs for the existing, low, base, and high scenarios for communities in the Southwest Alaska region, including visitor trips, which are described below.

TABLE 4
CURRENT AND 2010 FORECAST AIRPLANE TRIP ENDS

Community	Current Annual Average Airplane Trip Ends (Excluding Visitors)	Low 2010 Airplane Trip Ends	Base 2010 Airplane Trip Ends	High 2010 Airplane Trip Ends
Akhiok	1,122	1,153	1,216	1,290
Akutan	5,348	4,352	4,687	5,122
Atka	718	852	893	962
Chignik	1,040	785	823	886
Chignik Lagoon	622	680	710	763
Chignik Lake	2,162	2,231	2,360	2,553
Clarks Point	3,784	3,648	3,782	4,046
Cold Bay	21,371	16,740	17,383	18,585
Dillingham and Aleknagik	73,392	77,486	84,549	92,421
Egegik	3,728	3,928	4,150	4,487
Ekuk	1,334	1,244	1,248	1,315
Ekwok	622	686	724	780
False Pass	830	839	872	934
Igiugig	314	357	370	396
Iliamna and Newhalen	5,774	6,140	6,573	7,153
Ivanoff Bay	156	139	142	150
Kokhonak	240	257	272	295
Karluk	1,376	1,159	1,201	1,258
King Cove	6,108	6,536	7,132	7,853
King Salmon and Naknek	30,052	29,059	30,628	34,129
Kodiak and Vicinity	142,101	142,398	157,838	173,402
Koliganek	1,072	1,108	1,173	1,251
Larsen Bay	3,870	3,260	3,453	3,675
Levelock	1,254	1,275	1,342	1,448
Manokotak	3,718	3,700	3,979	4,323
Nelson Lagoon	344	363	380	408
New Stuyahok	1,466	1,607	1,724	1,857
Nikolski	162	194	199	212
Nondalton	134	150	161	175
Old Harbor	4,296	4,281	4,639	5,018
Ouzinkie	2,012	2,233	2,412	2,604
Perryville	488	454	476	513
Pilot Point	2,118	2,421	2,535	2,729
Port Alsworth	42	45	46	50
Port Heiden	1,798	1,836	1,938	2,094
Port Lions	2,904	2,717	2,928	3,155
Portage Creek	590	580	586	619
Sand Point	8,148	8,407	9,190	10,129
South Naknek	2,622	2,574	2,667	2,866
St. George	1,380	1,587	1,680	1,819
St. Paul	9,917	10,869	11,835	13,042
Togiak	8,093	9,454	10,246	11,169
Twin Hills	2,976	2,921	3,030	3,243
Unalaska	60,112	73,276	80,804	89,727
Total Tripends in Southwest Communities	421,710	435,982	474,977	520,905

TABLE 5
CURRENT AND 2020 FORECAST AIRPLANE TRIP ENDS

Community	Current Annual Average Airplane Trip Ends (Excluding Visitors)	Low 2020 Airplane Trip Ends	Base 2020 Airplane Trip Ends	High 2020 Airplane Trip Ends
Akhiok	1,122	1,150	1,274	1,398
Akutan	5,348	4,058	4,617	5,094
Atka	718	822	892	972
Chignik	1,040	725	794	877
Chignik Lagoon	622	699	765	845
Chignik Lake	2,162	2,260	2,528	2,814
Clarks Point	3,784	3,656	3,928	4,311
Cold Bay	21,371	15,549	16,508	17,786
Dillingham and Aleknagik	73,392	78,688	92,128	104,171
Egegik	3,728	3,981	4,444	4,943
Ekuk	1,334	1,234	1,248	1,339
Ekwok	622	707	783	869
False Pass	830	824	884	956
Igiugig	314	366	394	433
Iliamna and Newhalen	5,774	6,259	7,145	8,010
Ivanoff Bay	156	136	142	154
Kokhonak	240	261	293	327
Karluk	1,376	1,111	1,187	1,274
King Cove	6,108	6,462	7,547	8,400
King Salmon and Naknek	30,052	29,910	33,083	38,162
Kodiak and Surrounding	142,101	142,741	172,749	199,754
Koliganek	1,072	1,120	1,249	1,367
Larsen Bay	3,870	3,117	3,467	3,817
Levelock	1,254	1,289	1,429	1,585
Manokotak	3,718	3,709	4,238	4,753
Nelson Lagoon	344	358	388	421
New Stuyahok	1,466	1,636	1,863	2,068
Nikolski	162	188	196	210
Nondalton	134	155	177	198
Old Harbor	4,296	4,275	4,972	5,623
Ouzinkie	2,012	2,263	2,619	2,954
Perryville	488	451	497	550
Pilot Point	2,118	2,496	2,748	3,040
Port Alsworth	42	45	49	54
Port Heiden	1,798	1,850	2,061	2,290
Port Lions	2,904	2,697	3,106	3,491
Portage Creek	590	581	596	642
Sand Point	8,148	8,224	9,631	10,728
South Naknek	2,622	2,564	2,753	3,033
St. George	1,380	1,534	1,694	1,856
St. Paul	9,917	10,269	11,949	13,330
Togiak and Togiak Fish	8,093	9,758	11,302	12,734
Twin Hills	2,976	2,907	3,123	3,428
Unalaska	60,112	71,366	85,066	95,635
Total Tripends in Southwest Communities	421,710	434,451	508,508	576,694

Visitor Enplanement Forecasts

Because visitor trips to and throughout Alaska are increasing more rapidly than other trips, visitor enplanements were forecast separately. To forecast visitor enplanements, the average annual visitor enplanements in the most heavily visited areas in the region were estimated. The *Southwest Alaska Transportation Plan Existing Conditions Technical Memorandum* indicates that about 47,100 visitors traveled to Southwest Alaska in the summer of 1993. Our estimate assumed that currently about 50,000 annual visitors travel to Southwest Alaska by air. Each visitor was assumed to take two one-way plane trips: from Anchorage to one of the five major communities in Southwest Alaska, and back to Anchorage. The average number of visitor trip ends in the region, then, was estimated to be 100,000.⁴ As shown in Table 5, these trip ends were divided among the five communities with the most visitor attractions: Dillingham, Iliamna, King Salmon, Kodiak, and Unalaska.

Forecasts of visitor trips were then adjusted according to forecasts of tourism related employment in the Southwest region. The tourism-related employment forecasts were developed by the Institute of Social and Economic Research (ISER), which models tourism-related employment as a portion of retail trade, services, and transportation. ISER's forecasts indicate that the average annual increase in tourism-related employment in the southwest region through year 2020 for the low, base, and high scenarios is 2.3 percent, 3.1 percent, and 4.1 percent, respectively. Therefore, the visitor enplanement trip ends for the communities listed above were forecast to increase at an annual rate of 2.3 percent, 3.1 percent, and 4.1 percent through year 2020 for the low, base, and high scenarios, respectively. Current and forecast visitor airplane trip ends for the years 2010 and 2020 are presented in Tables 6 and 7.

TABLE 6
CURRENT AND 2010 FORECAST AIRPLANE VISITOR TRIP ENDS
FOR SELECTED SOUTHWEST ALASKA COMMUNITIES

Community	Current Visitor Trip Ends	Low 2010 Visitor Tripends	Base 2010 Visitor Tripends	High 2010 Visitor Tripends
Dillingham and Aleknagik	6,000	8,439	9,485	10,963
Iliamna and Newhalen	6,000	8,439	9,485	10,963
King Salmon and Naknek	56,000	78,763	88,525	102,317
Kodiak and Vicinity	16,000	22,504	25,293	29,234
Unalaska	16,000	22,504	25,293	29,234
Total	100,000	140,648	158,081	182,709

⁴ That is, if a visitor boards a plane in Anchorage and disembarks in Dillingham, this represents one trip end at Anchorage and one at Dillingham. If this same person then on the return trip boards a plane in Dillingham and disembarks in Anchorage, this again represents one trip end in Anchorage and one in Dillingham.

TABLE 7
CURRENT AND 2020 FORECAST AIRPLANE VISITOR TRIP ENDS
FOR SELECTED SOUTHWEST ALASKA COMMUNITIES

Community	Current Visitor Trip Ends	Low 2020 Visitor Tripends	Base 2020 Visitor Tripends	High 2020 Visitor Tripends
Dillingham and Aleknagik	6,000	10,594	12,871	16,384
Iliamna and Newhalen	6,000	10,594	12,871	16,384
King Salmon and Naknek	56,000	98,873	120,131	152,917
Kodiak and Vicinity	16,000	28,250	34,323	43,691
Unalaska	16,000	28,250	34,323	43,691
Total	100,000	176,559	214,519	273,066

Appendix A presents the total enplanement origin-destination pairs for the existing, low, base, and high scenarios for communities in the Southwest Alaska region. The tables in Appendix A include visitor trips.

Freight

Freight to the Southwest Alaska region travels through private mariner carriers, via large and small certificated air carriers, and via the Alaska Marine Highway System (AMHS). To forecast freight movements in the region, tons of freight transported in and out of the region were segregated according to type of cargo (petroleum products, fish products, and other products including mail). Most of the cargo-related data used in the Existing Conditions report was presented in tons or thousands of tons. Cargo on the AMHS was presented in van feet. The tonnage for van feet was estimated.⁵

Freight Forecasts for Petroleum Products

To forecast petroleum freight moved, several different variables were analyzed to determine which variables provided the best "fit" within the model. The best and final model included population, and a variable that indicated the type of airport and marine facilities at the community (either only a community services port, a commercial services port or airport HUB, or both a commercial services port and an airport HUB). For the purpose of the forecast it is assumed that the types of marine or airport facilities at a community will be the same in the year 2010 and 2020. This model is as follows:

$$\text{Tons of Petroleum Shipped} = (2.443375)(\text{Population}) + (27778.04)(\text{Port Types})$$

⁵ To estimate tonnage, van feet were multiplied by 650 for total pounds, then divided by 2000 to determine tons. The 650 pound figure is a conservative estimate based on Transportation Research Board, Special Report 223 - Providing Access for Large Trucks, 1989, p. 177. In the TRB report, for example, the cubic capacity for a 45 foot tractor semi-trailer was approximated to be 3,100 cubic feet. The payload weight is assumed to be 10 lb/ft³. Therefore, the total payload weight of this vehicle is estimated to be about 31,000 pounds, or about 689 pounds/foot.

The R² coefficient for this model was poor, about 0.286, indicating that only about 29 percent of the variation in petroleum shipped can be explained by population and marine and airport types. This model is based on a limited data set of only 11 records. Only a limited data set is available because confidentiality requirements. To help improve the accuracy of the model, forecast trips were adjusted as described in the Model Specification and Application section of this memorandum.

As shown in Tables 8 and 9, petroleum shipments are forecast to stay about the same at most communities in the southwest Alaska region. Petroleum shipments, however, are forecast to decrease at Cold Bay for the low, base, and high 2010 and 2020 scenarios. Shipments are also forecast to decrease slightly at several other communities in the low and base 2010 scenarios, and in the low 2020 scenario. These decreases are related to the projected decrease in population at these communities.

TABLE 8
CURRENT AND 2010 FORECAST ANNUAL PETROLEUM TONS SHIPPED FOR SOUTHWEST ALASKA COMMUNITIES

Community	Current Total Tons of Petroleum at Trip End	Low 2010 Tons of Petroleum	Base 2010 Tons of Petroleum	High 2010 Tons of Petroleum
Chignik	5,250	5,234	5,248	5,263
Cold Bay	2,750	2,742	2,743	2,743
Dillingham and Aleknagik	7,000	7,040	7,105	7,176
Egegik	375	375	376	376
False Pass	125	125	125	125
King Cove	3,375	3,390	3,412	3,437
King Salmon and Naknek	11,000	10,981	11,013	11,087
Kodiak and Vicinity	65,875	65,910	67,679	69,459
Old Harbor	625	625	627	629
Port Lions	625	624	625	627
Unalaska	293,500	299,610	303,248	307,514
Total	390,500	396,656	402,201	408,436

TABLE 9
CURRENT AND 2020 FORECAST ANNUAL PETROLEUM TONS
SHIPPED FOR SOUTHWEST ALASKA COMMUNITIES

Community	Current Total Tons of Petroleum at Trip End	Low 2020 Tons of Petroleum	Base 2020 Tons of Petroleum	High 2020 Tons of Petroleum
Chignik	5,250	5,232	5,258	5,280
Cold Bay	2,750	2,740	2,741	2,742
Dillingham and Aleknagik	7,000	7,051	7,175	7,284
Egegik	375	375	376	377
False Pass	125	125	125	125
King Cove	3,375	3,388	3,428	3,458
King Salmon and Naknek	11,000	11,000	11,065	11,171
Kodiak and Vicinity	65,875	65,952	69,389	72,479
Old Harbor	625	625	629	632
Port Lions	625	624	626	629
Unalaska	293,500	298,707	305,339	310,392
Total	390,500	395,820	406,153	414,570

Freight Forecasts for Fish Products

Forecasts of fish tons shipped were developed according to forecasts of fisheries related employment in the southwest region. The fisheries-related employment forecasts were developed by the Institute of Social and Economic Research (ISER). Most fisheries-related forecasts indicate no change in fisheries-related employment in the future. This scenario is reflected in ISER's 2010 and 2020 base year forecast. However, to keep the freight forecasts for fish products consistent with the other forecasts, low and high forecasts are also presented. The low and high forecasts indicate only minor changes of -1.0 percent and +0.5 percent, respectively. Therefore, the fish tons shipped for the communities listed were forecast to decrease at an annual rate of 1.0 percent through 2020 for the low scenario, remain constant for the base scenario, and increase at an annual rate of 0.5 percent through year 2020 for the high scenario. Current and forecast fish tons shipped for the years 2010 and 2020 are presented in Tables 10 and 11.

TABLE 10
CURRENT AND 2010 FORECAST ANNUAL FISH TONS SHIPPED
FOR SOUTHWEST ALASKA COMMUNITIES

Community	Current Tons Fish	Low 2010 Fish (-1.0% annual change)	Base 2010 Fish (0% annual change)	High 2010 Fish (+0.5% annual change)
Chignik	375	323	375	404
Dillingham and Aleknagik	3,750	3,225	3,750	4,041
Egegik	1,125	968	1,125	1,212
King Cove	3,625	3,118	3,625	3,907
King Salmon and Naknek	24,375	20,964	24,375	26,269
Kodiak and Vicinity	105,625	90,844	105,625	113,830
Old Harbor	125	108	125	135
Unalaska	383,250	329,617	383,250	413,022
Total	522,250	449,165	522,250	562,820

TABLE 11
CURRENT AND 2020 FORECAST ANNUAL FISH TONS SHIPPED
FOR SOUTHWEST ALASKA COMMUNITIES

Community	Current Tons Fish	Low 2020 Fish (-1.0% annual change)	Base 2020 Fish (0% annual change)	High 2020 Fish (+0.5% annual change)
Chignik	375	292	375	425
Dillingham and Aleknagik	3,750	2,917	3,750	4,248
Egegik	1,125	875	1,125	1,274
King Cove	3,625	2,820	3,625	4,106
King Salmon and Naknek	24,375	18,959	24,375	27,612
Kodiak and Vicinity	105,625	82,157	105,625	119,652
Old Harbor	125	97	125	142
Unalaska	383,250	298,100	383,250	434,144
Total	522,250	406,217	522,250	591,602

Freight Forecasts for Other Products Including Mail

To forecast freight movement for other products, including mail, several different variables were analyzed to determine which variables provided the best "fit" in terms of enabling the model to most closely replicate existing movements. The best and final model included just population as a variable. This model is as follows:

$$\text{Tons of Other Cargo Shipped} = (36.21088203)(\text{Population})$$

The R^2 coefficient for this model was about 0.95, indicating that about 95 percent of the variation in other cargo shipped can be explained by population. This model is based on a limited data set of only 16 records. To help improve the accuracy of the model, forecast trips were adjusted as described in the Model Specification and Application section of this memorandum.

As shown in Tables 12 and 13, other cargo shipped are forecast to increase at most communities in the southwest Alaska region. Shipments, however, are forecast to decrease at Cold Bay for the low, base, and high 2010 and 2020 scenarios. This decrease corresponds to the forecast for a decreasing population in Cold Bay through the year 2020. In the low and base 2010 scenarios, shipments are also forecast to decrease at Chignik. Shipments are also forecast to decrease at several other communities for the low scenario only for 2010 and 2020.

TABLE 12
CURRENT AND 2010 FORECAST ANNUAL OTHER CARGO TONS
SHIPPED TO/FROM SOUTHWEST ALASKA COMMUNITIES

Community	Current Other Annual Cargo Tons	Low 2010 Other Cargo Tons	Base 2010 Other Cargo Tons	High 2010 Other Cargo Tons
Chignik	2,500	2,259	2,464	2,706
Cold Bay	935	437	485	539
Dillingham and Aleknagik	11,265	11,959	13,095	14,335
Egegik	375	409	446	490
False Pass	125	120	133	148
Iliamna and Newhalen	976	1,058	1,154	1,267
King Cove	4,414	4,765	5,287	5,877
King Salmon and Naknek	24,387	23,562	24,968	28,133
Kodiak and Vicinity	427,903	428,837	475,737	522,943
Port Heiden	114	118	129	141
Port Lions	882	805	893	982
Sand Point	139	144	159	177
St. George	60	61	68	76
St. Paul	176	186	206	229
Togiak	139	168	184	201
Unalaska	122,930	149,559	165,417	184,009
Total	597,318	624,448	690,827	762,254

TABLE 13
CURRENT AND 2020 FORECAST ANNUAL OTHER CARGO TONS
SHIPPED TO/FROM SOUTHWEST ALASKA COMMUNITIES

Community	Current Other Annual Cargo Tons	Low 2020 Other Cargo Tons	Base 2020 Other Cargo Tons	High 2020 Other Cargo Tons
Chignik	2,500	2,227	2,624	2,973
Cold Bay	935	343	412	463
Dillingham and Aleknagik	11,265	12,156	14,315	16,217
Egegik	375	419	494	560
False Pass	125	119	143	160
Iliamna and Newhalen	976	1,086	1,279	1,450
King Cove	4,414	4,721	5,675	6,372
King Salmon and Naknek	24,387	24,371	27,196	31,788
Kodiak and Vicinity	427,903	429,946	521,091	603,030
Port Heiden	114	120	141	160
Port Lions	882	803	973	1,126
Sand Point	139	140	169	189
St. George	60	58	70	79
St. Paul	176	175	209	236
Togiak	139	174	205	232
Unalaska	122,930	145,625	174,530	196,553
Total	597,318	622,484	749,526	861,588

Highways

There are few roads that connect communities in Southwest Alaska. The few roads that do connect communities are the Dillingham-Aleknagik Road, the King Salmon-Naknek Road, the Newhalen-Iliamna Road, the Pile Bay-Williamsport Road, the Iliamna-Nondalton Road, and several roads on Kodiak Island. Travel information is only available on three of these roads. As presented in the *Southwest Alaska Transportation Plan - Existing Conditions Technical Memorandum*, Annual Average Daily Traffic (AADT) is only available on the three following highway segments: Dillingham-Aleknagik Road, the King Salmon-Naknek Road, and the Kodiak-Women's Bay/Chiniak Road. Because good traffic forecasts can't be developed without knowing existing traffic volumes, traffic forecasts for these three segments only have been developed.

However, since we have only three records of data to develop a model from, the regression model developed for highway trips may be less reliable than some of the other models. Nevertheless, several different variables were analyzed to determine which variables provided the best "fit" within the model. The variables finally included in the model are the current population in each end of the highway link. The population of the more highly populated community is called "Population End 1" while the population of the less populated community is called "Population End 2." This model is presented below:

$$\text{Annual Highway Person-trips} = (104.35)(\text{Population End 1}) + (421.20)(\text{Population End 2})$$

The R^2 coefficient for this model was very high, about .98. This indicates that about 98 percent of the variation in person-trips on a highway link can be explained by the population of the two trip ends. This high R^2 coefficient, however, is not too surprising since only three records of data were available, which in some cases can make it easier to fit a model. The use of this model on a more widespread basis, however, must be done with caution since it is based on so few data points. Forecasts for highway person-trips on a given link (using low, base, and high population forecasts) for the years 2010 and 2020 are presented in Tables 14 and 15.

TABLE 14
CURRENT AND YEAR 2010 DAILY VEHICLE TRIPS AND
AVERAGE ANNUAL PERSON-TRIPS ON HIGHWAY LINKS IN
SOUTHWEST ALASKA⁶

	Current Average	2010 Low	2010 Base	2010 High
Dillingham to/from Aleknagik				
<i>Average Daily Vehicle Trips</i>	401	412	436	491
<i>Average Annual Person-Trips</i>	234,184	240,385	254,737	287,027
King Salmon to/from Naknek				
<i>Average Daily Vehicle Trips</i>	518	523	573	627
<i>Average Annual Person-Trips</i>	302,512	305,418	334,442	366,106
Kodiak to/from Women's Bay and Chiniak				
<i>Average Daily Vehicle Trips</i>	1,742	1,754	1,946	2,139
<i>Average Annual Person-Trips</i>	1,017,328	1,024,365	1,136,393	1,249,154

⁶ For Dillingham-Aleknagik Road, used annual average daily traffic (AADT) on the 15.68 mile segment of the road. For 1991 through 1996, the AADT of 401 was multiplied by 1.6 for average national vehicle occupancy rate to get average daily person-trips. This number was multiplied by 365 for average annual person-trips. For King Salmon - Naknek Road, used AADT on the 11.98 mile segment of road that junctions with Milepost 1. For 1991 through 1996, the AADT of 518 was multiplied by 1.6 for average national vehicle occupancy rate to get average daily person-trips. This number was multiplied by 365 for average annual person-trips. For Kodiak-Women's Bay, used AADT on the 4.65 mile segment of road that junctions with the road east of Salomie Creek. For the years 1994 through 1996, the AADT of 1742 was multiplied by 1.6 for average national vehicle occupancy rate to get average daily person-trips. This number was multiplied by 365 for average annual person-trips.

TABLE 15
CURRENT AND YEAR 2020 DAILY VEHICLE TRIPS AND
AVERAGE ANNUAL PERSON-TRIPS ON HIGHWAY LINKS IN
SOUTHWEST ALASKA

	Current Average	2020 Low	2020 Base	2020 High
Dillingham to/from Aleknagik				
<i>Average Daily Vehicle Trips</i>	401	421	496	562
<i>Average Annual Person-Trips</i>	234,184	245,908	289,579	328,051
King Salmon to/from Naknek				
<i>Average Daily Vehicle Trips</i>	518	544	608	710
<i>Average Annual Person-Trips</i>	302,512	317,985	354,853	414,763
Kodiak to/from Women's Bay and Chiniak				
<i>Average Daily Vehicle Trips</i>	1,742	1,760	2,133	2,468
<i>Average Annual Person-Trips</i>	1,017,328	1,027,778	1,245,658	1,441,530

Alaska Marine Highway System (AMHS)

The AMHS connects communities with each other, with regional centers, and with the continental road system. It is an integral part of Alaska's transportation system, reaching many communities which would otherwise be effectively cut off from the rest of the state. To forecast AMHS trips, several different variables were analyzed to determine which variables provided the best "fit" within the model. Rather than forecasting AMHS trip ends, trip ends per annual port calls were forecasted. For the 2010 and 2020 forecasts, it was assumed that the number of port calls at each of the communities remain unchanged. Future analysis, however, could include an estimation of how changing service levels might impact travel demand. The best and final model included population and income as variables. This model is as follows:

$$\text{Annual AMHS Trips/Average Annual Port Calls} = (0.006805491)(\text{Population}) + (0.00071749)(\text{Income})$$

The R² coefficient for this model was about 0.81, indicating that 81 percent of the variation in AMHS trips per port calls can be explained by population and income. Note, however, that this model is based on a limited data set of only nine records. To help improve the accuracy of the model, forecast trips were adjusted as described in the Model Specification and Application section of this memorandum.

The 2010 and 2020 forecasts of AMHS trip ends are presented in Tables 16 and 17. As described previously, the model developed to forecast AMHS trips included forecasts for population and income as variables. However, population was the most influential variable in the model so differences in AMHS forecasts can primarily be attributed to differences in population forecasts. AMHS trip ends increase most significantly for Unalaska, Port Lions, King Cove, and Kodiak. Population forecasts for these communities indicate higher populations in the years 2010 and 2020 in the low, base, and high scenarios (except for Port Lions in the low scenario, which is forecast to experience a slight decrease in population, but an increase in income). For the low scenario, AMHS trip ends decrease for Akutan and Cold Bay. Population and income forecasts for these two communities indicate lower populations in the year 2020 in

the low, base, and high scenarios, but higher incomes in the base and high scenarios. Appendix B presents the AMHS origin-destination pairs for the existing, low, base, and high scenarios for communities in the Southwest Alaska region.

TABLE 16
CURRENT AND 2010 FORECASTS OF AMHS TRIP ENDS FOR
SOUTHWEST ALASKA COMMUNITIES

Community	Annual Port Calls (93 - 96)	Current Average AMHS Passenger Trip Ends	Low 2010 AMHS Tripends	Base 2010 AMHS Tripends	High 2010 AMHS Tripends
Kodiak and Surrounding	137	11,109	11,260	12,392	13,670
Port Lions	54	604	638	678	760
Unalaska	8	563	601	657	730
Sand Point	16	360	357	384	428
Chignik	16	352	337	355	390
King Cove	16	314	314	338	377
Cold Bay	16	117	111	118	132
False Pass	8	39	38	40	45
Akutan	8	38	36	38	42
Total	279	13,496	13,692	14,999	16,574

TABLE 17
CURRENT AND 2020 FORECASTS OF AMHS TRIP ENDS FOR
SOUTHWEST ALASKA COMMUNITIES

Community	Annual Port Calls (93 - 96)	Current Average AMHS Passenger Trip Ends	Low 2020 AMHS Tripends	Base 2020 AMHS Tripends	High 2020 AMHS Tripends
Kodiak and Surrounding	137	11,109	11,284	13,380	15,415
Port Lions	54	604	638	683	770
Unalaska	8	563	591	680	763
Sand Point	16	360	355	390	437
Chignik	16	352	336	359	396
King Cove	16	314	314	344	385
Cold Bay	16	117	110	117	131
False Pass	8	39	38	41	45
Akutan	8	38	35	38	42
Total	279	13,496	13,701	16,034	18,385

APPENDIX A - ENPLANEMENT ORIGIN-DESTINATION PAIRS FOR EXISTING, AND 2010 AND 2020 LOW, BASE, AND HIGH SCENARIOS

Table 18 - Current Average Annual Passenger Volumes by Origin/Destination - Small and Large Certificated Air Carriers

Origin		Destination	Outside					Aleutians East Borough					Aleutians West Borough					Bristol		Dillingham Census Area										Kodiak Island Borough						Lake and Peninsula Borough										Total						
			Southwest Region															Bay Borough																																		
			Anchorage	Bethel	Homer	Kenai	Seattle/Portland	Akutan	Cold Bay	False Pass	King Cove	Nelson Lagoon	Sand Point	Atka	Nikolski	St. George	St. Paul	Unalaska	King Salmon and Naknek	South Naknek	Clarks Point	Dillingham and Aleknagik	Ekuk	Ekwok	Koliganek	Manokotak	New Stuyahok	Portage Creek	Togiak	Twin Hills	Akhiok	Karluk	Kodiak and Surroundings	Larsen Bay	Old Harbor	Ouzinkie	Port Lions	Chignik	Chignik Lagoon	Chignik Lake	Egegik	Igiugig	Iliamna and Newhalen	Ivanof Bay	Kokhonak	Levelock	Nondalton	Perryville	Pilot Point	Port Alsworth	Port Heiden	
Outside SW Region	Anchorage							5,980				3,537				690	4,619	33,299	32,967			23,949											67,054								5,679								487	178,261		
	Bethel																					627																												627		
	Homer																																509																	509		
	Kenai																																280																	280		
	Seattle/Portland																		331	366			88										2,532																		3,317	
Aleutians East Borough	Akutan																	2,674																																2,674		
	Cold Bay	6,140							415	3,054	172	253					157	462	34																																10,687	
	False Pass							415																																											415	
	King Cove							3,054																																										3,054		
	Nelson Lagoon							172																																										172		
	Sand Point	3,573						452											77																															4,102		
Aleutians West Borough	Atka																	359																																	359	
	Nikolski																	81																																	81	
	St. George	690																																																	690	
	St. Paul	4,743						66										194																																5,003		
	Unalaska	34,518					279	2,674	509				77	359	81		138																																		38,635	
Bristol Bay Borough	King Salmon and Naknek	32,619					398		36										1,081			2,544											167					520	311	1,011	1,864	157		78		351		244	1,059		466	42,906
	South Naknek																		1,081			230																												1,311		
Dillingham Census Area	Clarks Point																					1,892																													1,892	
	Dillingham	24,420	627																2,470	230	1,892		667	311	536	1,859	733	295	4,047	1,488																					39,851	
	Ekuk																					667																												667		
	Ekwok																					311																												311		
	Koliganek																					536																												536		
	Manokotak																					1,859																												1,859		
	New Stuyahok																					733																												733		
	Portage Creek																					295																												295		
	Togiak																					4,047																												4,047		
Twin Hills																					1,488																													1,488		
Kodiak Island Borough	Akhiok																																																		561	
	Karluk																																																		688	
	Kodiak	69,736		509	280	1,147													167														561	688	78,402	1,935	2,148	1,006	1,452			70									79,699	
	Larsen Bay																																																	1,935		
	Old Harbor																																																	2,148		
	Ouzinkie																																																	1,006		
Port Lions																																																				

Table 19 - Low 2010 Forecast Average Annual Passenger Volumes by Origin/Destination - Small and Large Certificated Air Carriers

[illegible]

Table 20 - Base 2010 Forecast Average Annual Passenger Volumes by Origin/Destination - Small and Large Certificated Air Carriers

Origin		Destination	Outside					Aleutians East Borough					Aleutians West Borough					Bristol Bay Borough		Dillingham Census Area												Kodiak Island Borough						Lake and Peninsula Borough												Total
			Southwest Region																																															
			Anchorage	Bethel	Homer	Kenai	Seattle/Portland	Akutan	Cold Bay	False Pass	King Cove	Nelson Lagoon	Sand Point	Atka	Nikolski	St. George	St. Paul	Unalaska	King Salmon and Naknek	South Naknek	Clarks Point	Dillingham and Aleknagik	Ekuk	Ekwok	Koliganek	Manokotak	New Stuyahok	Portage Creek	Togiak	Twin Hills	Akhiok	Karluk	Kodiak and Surroundings	Larsen Bay	Old Harbor	Ouzinkie	Port Lions	Chignik	Chignik Lagoon	Chignik Lake	Egegik	Igiugig	Iliamna and Newhalen	Ivanof Bay	Kokhonak	Levelock	Nondalton	Perryville	Pilot Point	
Outside SW Region	Anchorage						3,621			4,067			840	5,601	48,880	48,866				29,612											79,614								7,789							504	229,397			
	Bethel																			744																											744			
	Homer																														577																577			
	Kenai																														318																318			
	Seattle/Portland															474	339		104												2,871																3,789			
Aleutians East Borough	Akutan															2,345																																2,345		
	Cold Bay	3,739						433	3,539	189	215			138	447	26																																8,725		
	False Pass						433																																								433			
	King Cove						3,538																																							3,538				
	Nelson Lagoon						188																																							188				
	Sand Point	4,111					383									99																															4,594			
Aleutians West Census Area	Atka															447																																447		
	Nikolski															100																																100		
	St. George	840																																													840			
	St. Paul	5,607					57									253																															5,917			
	Unalaska	49,018				383	2,345	479			97	447	100		178																																	53,046		
Bristol Bay Borough	King Salmon and Naknek	48,697				382		28									1,078		2,721												174					411	354	1,096	2,071	184		71	358	238	1,265	465	59,593			
	South Naknek																1,072		259																												1,331			
	Clarks Point																		1,892																												1,892			
	Dillingham and Aleknagik	29,874	736														2,582	254	1,892	624	362	587	1,990	862	293	5,125	1,516																				47,009			
	Ekuk																		624																											624				
	Ekwok																		362																											362				
	Koliganek																		587																										587					
	Manokotak																		1,990																										1,990					
	New Stuyahok																		862																										862					
	Portage Creek																		293																										293					
	Togiak																		5,125																											5,125				
	Twin Hills																		1,516																											1,516				
Kodiak Island Borough	Akhiok																																														608			
	Karluk																																													601				
	Kodiak and Surrounding	81,236		566	311	1,274											170														608	601		1,727	2,320	1,206	1,464			82							91,565			
	Larsen Bay																																													1,727				
	Old Harbor																																													2,320				
	Ouzinkie																																													1,206				
Port Lions																																													1,464					
Lake and Peninsula Borough	Chignik																410																														410			
	Chignik Lagoon																354																														354			
	Chignik Lake																1,093																													1,177				
	Egegik																2,070																													2,070				
	Igiugig																184																												184					
	Iliamna and Newhalen	7,789																																												8,029				
	Ivanof Bay																71																												71					
	Kokhonak																																													136				
	Levelock																																													670				
	Nondalton																				</																													

Table 21 - High 2010 Forecast - Average Annual Passenger Volumes by Origin/Destination - Small and Large Certificated Air Carriers (With Visitor Trips Included)

Origin		Destination	Outside Southwest Region					Aleutians East Borough					Aleutians West Borough				Bristol Bay Borough		Dillingham Census Area										Kodiak Island Borough						Lake and Peninsula Borough										Total												
			Anchorage	Bethel	Homer	Kenai	Seattle/Portland	Akutun	Cold Bay	False Pass	King Cove	Nelson Lagoon	Sand Point	Atka	Nikolski	St. George	St. Paul	Unalaska	King Salmon and Naknek	South Naknek	Clarks Point	Dillingham and Aleknagik	Ekuk	Ekwok	Koliganek	Manokotak	New Stuyahok	Portage Creek	Togiak	Twin Hills	Akhiok	Karluk	Kodiak and Surroundings	Larsen Bay	Old Harbor	Ouzinkie	Port Lions	Chignik	Chignik Lagoon	Chignik Lake	Egegik	Igiugig	Iliamna and Newhalen	Ivanof Bay		Kokhonak	Levelock	Nondalton	Perryville	Pilot Point	Port Alsworth	Port Heiden					
Outside SW Region	Anchorage						3,855				4,491			910	6,173	54,900	56,498				32,738											88,368									8,798							533	257,264								
	Bethel																				816																													816							
	Homer																															636																				636					
	Kenai																															350																				350					
	Seattle/Portland																527	393			114											3,162																				4,197					
Aleutians East Borough	Akutun																2,571																																				2,571				
	Cold Bay	3,980						458	3,849	200	234				150	489	29																																				9,389				
	False Pass							458																																												458					
	King Cove							3,847																																												3,847					
	Nelson Lagoon							200																																											200						
	Sand Point	4,535						416									110																																					5,061			
Aleutians West Census Area	Atka																482																																							482	
	Nikolski																106																																							106	
	St. George	910																																																							910
	St. Paul	6,179						62									280																																						6,521		
	Unalaska	55,055				425	2,570	524				107	482	106		197																																					59,467				
Bristol Bay Borough	King Salmon and Naknek	56,295				443		31										1,164		3,064												197						443	381	1,188	2,239	197		75	392	256	1,361	514	68,240								
	South Naknek																	1,158		272																																	1,430				
	Clarks Point																			2,028																																		2,028			
	Dillingham and Aleknagik	33,029	806															2,909	267	2,027	659	391	627	2,165	930	310	5,590	1,624																												51,666	
	Ekuk																			659																																	659				
	Ekwok																			391																																	391				
	Koliganek																			627																																627					
	Manokotak																			2,165																																			2,165		
	New Stuyahok																			930																																			930		
	Portage Creek																			310																																			310		
	Togiak																			5,591																																			5,591		
	Twin Hills																			1,625																																				1,625	
Kodiak Island Borough	Akhiok																																646																						646		
	Karluk																																630																						630		
	Kodiak and Surrounding	90,157		623	343	1,403											192															645	630		1,840	2,510	1,302	1,579			86												101,311				
	Larsen Bay																																1,841																						1,841		
	Old Harbor																																2,511																						2,511		
	Ouzinkie																																1,302																								

Table 22 - Low 2020 Forecast - Average Annual Passenger Volumes by Origin/Destination - Small and Large Certificated Air Carriers

Origin	Destination	Outside Southwest Region					Aleutians East Borough					Aleutians West Borough					Bristol Bay Borough		Dillingham Census Area										Kodiak Island Borough						Lake and Peninsula Borough												Total				
		Anchorage	Bethel	Homer	Kenai	Seattle/Portland	Akutan	Cold Bay	False Pass	King Cove	Nelson Lagoon	Sand Point	Atka	Nikolski	St. George	St. Paul	Unalaska	King Salmon and Naknek	South Naknek	Clarks Point	Dillingham and Aleknagik	Ekuk	Ekwok	Koliganek	Manokotak	New Stuyahok	Portage Creek	Togiak	Twin Hills	Akhiok	Karluk	Kodiak and Surroundings	Larsen Bay	Old Harbor	Ouzinkie	Port Lions	Chignik	Chignik Lagoon	Chignik Lake	Egegik	Igiugig	Iliamna and Newhalen	Ivanof Bay	Kokhonak	Levelock	Nondalton		Perryville	Pilot Point	Port Alsworth	Port Heiden
Outside SW Region	Anchorage						3,306			3,633			767	4,856	46,109	54,091			28,046												74,533								8,196							472	224,009				
	Bethel																		681																													681			
	Homer																														521																		521		
	Kenai																														286																		286		
	Seattle/Portland																418	343		96											2,590																		3,447		
Aleutians East Borough	Akutan															2,044																																		2,044	
	Cold Bay	3,411						402	3,149	174	194				122	401	25																																	7,878	
	False Pass							401																																									401		
	King Cove							3,147																																								3,147			
	Nelson Lagoon																																															174			
	Sand Point	3,674						346									88																																4,109		
Aleutians West Census Area	Atka															412																																			412
	Nikolski															94																																			94
	St. George	767																																																767	
	St. Paul	4,862															222																																	5,134	
	Unalaska	46,232				338	2,042	429			86	412	94		156																																				49,789
Bristol Bay Borough	King Salmon and Naknek	53,914				386		27									1,045		2,612												166						363	348	1,052	1,983	182		68	352	225	1,243	452	64,418			
	South Naknek																1,039		238																														1,277		
	Clarks Point																		1,831																														1,831		
	Dillingham and Aleknagik	28,294	673														2,480	234	1,830	618	353	560	1,857	818	291	4,877	1,455																							44,631	
	Ekuk																		618																													618			
	Ekwok																		353																													353			
	Koliganek																		561																													561			
	Manokotak																		1,857																													1,857			
	New Stuyahok																		818																													818			
	Portage Creek																		291																														291		
	Togiak																		4,878																														4,878		
	Twin Hills																	1,455																																1,455	
Kodiak Island Borough	Akhiok																																																	575	
	Karluk																																																557		
	Kodiak and Surrounding	76,000		510	281	1,150											162														575	557		1,562	2,138	1,131	1,350													85,489	
	Larsen Bay																																																1,562		
	Old Harbor																																																2,139		
	Ouzinkie																																																1,131		
	Port Lions																																																	1,350	
Lake and Peninsula Borough	Chignik																362																																		362
	Chignik Lagoon																347																																		347
	Chignik Lake																1,049																																		1,125
	Egegik																1,980																																	1,980	
	Igiugig																182																																182		
	Iliamna and Newhalen	8,196																																																8,427	
	Ivanof Bay																68																																	68	
	Kokhonak																																																		

Table 23 - Base 2020 Forecast Average Annual Passenger Volumes by Origin/Destination - Small and Large Certificated Air Carriers

[illegible]

Table 24 - High 2020 Forecast - Average Annual Passenger Volumes by Origin/Destination - Small and Large Certificated Air Carriers (With Visitor Trips Included)

Origin		Destination	Outside Southwest Region					Aleutians East Borough					Aleutians West Borough					Bristol Bay Borough		Dillingham Census Area										Kodiak Island Borough						Lake and Peninsula Borough													Total																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
			Anchorage	Bethel	Homer	Kenai	Seattle/Portland	Aktutan	Cold Bay	False Pass	King Cove	Nelson Lagoon	Sand Point	Atka	Nikolski	St. George	St. Paul	Unalaska	King Salmon and Naknek	South Naknek	Clarks Point	Dillingham and Aleknagik	Ekuk	Ekwok	Koliganek	Manokotak	New Stuyahok	Portage Creek	Togiak	Twin Hills	Akhiok	Karluk	Kodiak and Surroundings	Larsen Bay	Old Harbor	Ouzinkie	Port Lions	Chignik	Chignik Lagoon	Chignik Lake	Egegik	Igiugig	Iliamna and Newhalen	Ivanof Bay	Kokhonak	Levelock	Nondalton	Perryville		Pilot Point	Port Alsworth	Port Heiden																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
Outside SW Region	Anchorage						3,368			4,771			928	6,313	65,010	82,560				39,202											107,268								11,908								574	321,902																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Bethel																			928																												928																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Homer																														736																	736																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Kenai																														405																	405																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Seattle/Portland																565	450			130										3,663																		4,807																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Aleutians East Borough	Aktutan																																																2,569																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	Cold Bay	3,486																29																															9,082																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	False Pass							461	4,048	203	228																																					461																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	King Cove							4,045																																							4,045																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	Nelson Lagoon							203																																							203																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	Sand Point	4,834						407									118																														5,358																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							

APPENDIX B - AMHS ORIGIN-DESTINATION PAIRS FOR EXISTING, AND 2010 AND 2020 LOW, BASE, AND HIGH SCENARIOS

Table 25 - Current Passenger Volumes by Origin/Destination - AMHS

Origin		Destination	Outside SW Region				Aleutians East Borough					Aleutians West Census Area	Kodiak Island Borough		Lake and Peninsula Borough	Total
			Homer	Seldovia	Seward	Valdez	Akutan	Cold Bay	False Pass	King Cove	Sand Point	Unalaska	Kodiak	Port Lions	Chignik	
Outside SW Region	Homer						1	7	7	37	39	162	3,822	103	42	4,220
	Seldovia											10	89	1	1	101
	Seward									1		5	1,523	62		1,591
	Valdez												68			68
Aleutians East Borough	Akutan	1										12			2	15
	Cold Bay	5			2				3	22	16	7	2			57
	False Pass						1			1	1	4				7
	King Cove	23					1	31	9		73	12	6	1	1	157
	Sand Point	22			17			13	12	78		14	23	2	11	192
Aleutians West Census Area	Unalaska	101	2	49			16	7	1	11	10		57		6	260
Kodiak Island Borough	Kodiak	3,517	45	1,369	32			2		5	18	67		145	92	5,292
	Port Lions	120	2	34						1	2		131			290
Lake and Peninsula Borough	Chignik	49	1	27			4			1	9	10	96			197
Total			3,838	50	1,498	32	23	60	32	157	168	303	5,817	314	155	12,447

Table 26 - Low 2010 Forecast of Passenger Volumes by Origin/Destination - AMHS

Origin	Destination	Outside SW Region				Aleutians East Borough					Aleutians West Census Area	Kodiak Island Borough		Lake and Peninsula Borough	Total
		Homer	Seldovia	Seward	Valdez	Akutan	Cold Bay	False Pass	King Cove	Sand Point	Unalaska	Kodiak	Port Lions	Chignik	
Outside SW Region	Homer						4	2	37	42	140	3,684	102	42	4,053
	Seldovia										9	86	1	1	96
	Seward								1		4	1,468	61		1,535
	Valdez											66			66
Aleutians East Borough	Akutan										16			3	19
	Cold Bay	3		1				1	22	17	9	2			56
	False Pass					1			3	3	14				20
	King Cove	23				1	30	7		76	12	6	1	1	155
	Sand Point	20		15			12	9	74		13	22	2	11	178
Aleutians West Census Area	Unalaska	117	2	57		15	9	1	13	12		68		6	299
Kodiak Island Borough	Kodiak	3,739	48	1,455	34		2		5	20	72		152	104	5,631
	Port Lions	135	2	38					1	2		139			319
Lake and Peninsula Borough	Chignik	37	1	20		3			1	8	8	90			168
Total		4,075	53	1,588	34	19	57	19	157	179	298	5,631	319	168	12,596

Table 27 - Base 2010 Forecast of Passenger Volumes by Origin/Destination - AMHS

Origin	Destination	Outside SW Region				Aleutians East Borough					Aleutians West Census Area	Kodiak Island Borough		Lake and Peninsula Borough	Total
		Homer	Seldovia	Seward	Valdez	Akutan	Cold Bay	False Pass	King Cove	Sand Point	Unalaska	Kodiak	Port Lions	Chignik	
Outside SW Region	Homer						4	2	40	45	154	4,060	107	43	4,453
	Seldovia										9	95	1	1	106
	Seward								1		5	1,618	64		1,688
	Valdez											72			72
Aleutians East Borough	Akutan										18			3	20
	Cold Bay	3		1				1	23	18	9	2			60
	False Pass					1			3	3	15				21
	King Cove	25				1	31	7		81	13	6	1	1	167
	Sand Point	21		17			13	9	80		14	24	2	11	192
Aleutians West Census Area	Unalaska	128	3	62		16	10	1	14	13		74		7	327
Kodiak Island Borough	Kodiak	4,120	53	1,604	37		2		6	21	80		163	111	6,197
	Port Lions	142	2	40					1	3		150			339
Lake and Peninsula Borough	Chignik	38	1	21		3			1	9	9	96			177
Total		4,479	58	1,745	37	20	60	21	168	193	325	6,196	339	177	13,819

Table 28 - High 2010 Forecast of Passenger Volumes by Origin/Destination - AMHS

Origin	Destination	Outside SW Region				Aleutians East Borough					Aleutians West Census Area	Kodiak Island Borough		Lake and Peninsula Borough	Total
		Homer	Seldovia	Seward	Valdez	Akutan	Cold Bay	False Pass	King Cove	Sand Point	Unalaska	Kodiak	Port Lions	Chignik	
Outside SW Region	Homer						4	2	44	50	172	4,477	120	48	4,917
	Seldovia										11	104	1	1	117
	Seward								1		5	1,784	72		1,863
	Valdez											80			80
Aleutians East Borough	Akutan										19			3	22
	Cold Bay	4		2				1	26	21	11	2			66
	False Pass					1			3	3	16				23
	King Cove	28				1	35	8		91	15	7	1	1	187
	Sand Point	24		19			14	10	89		16	26	2	13	214
Aleutians West Census Area	Unalaska	143	3	69		17	11	1	15	14		82		8	364
Kodiak Island Borough	Kodiak	4,543	58	1,768	41		2		6	24	89		183	121	6,836
	Port Lions	160	3	45					1	3		168			380
Lake and Peninsula Borough	Chignik	42	1	23		3			1	10	10	105			195
Total		4,944	64	1,926	41	22	67	23	188	215	363	6,835	380	195	15,263

Table 29 - Low 2020 Forecast of Passenger Volumes by Origin/Destination - AMHS

Origin	Destination	Outside SW Region				Aleutians East Borough					Aleutians West Census Area	Kodiak Island Borough		Lake and Peninsula Borough	Total
		Homer	Seldovia	Seward	Valdez	Akutan	Cold Bay	False Pass	King Cove	Sand Point	Unalaska	Kodiak	Port Lions	Chignik	
Outside SW Region	Homer						6	3	37	41	150	3,701	103	46	4,086
	Seldovia										9	86	1	1	98
	Seward								1		5	1,475	62		1,542
	Valdez											66			66
Aleutians East Borough	Akutan	1									14			2	18
	Cold Bay	5		2				2	22	16	7	2			55
	False Pass					2			3	3	11				19
	King Cove	24				1	29	6		77	12	6	1	1	157
	Sand Point	20		16			11	7	75		13	22	2	11	177
Aleutians West Census Area	Unalaska	122	2	59		12	7	1	12	11		62		7	295
Kodiak Island Borough	Kodiak	3,756	48	1,462	34		2		5	19	67		150	99	5,642
	Port Lions	137	2	39					1	2		138			319
Lake and Peninsula Borough	Chignik	40	1	22		2			1	8	9	85			168
Total		4,105	54	1,599	34	18	55	19	157	177	295	5,642	319	68	12,643

Table 30 - Base 2020 Forecast of Passenger Volumes by Origin/Destination - AMHS

Origin	Destination	Outside SW Region				Aleutians East Borough					Aleutians West Census Area	Kodiak Island Borough		Lake and Peninsula Borough	Total
		Homer	Seldovia	Seward	Valdez	Akutan	Cold Bay	False Pass	King Cove	Sand Point	Unalaska	Kodiak	Port Lions	Chignik	
Outside SW Region	Homer						6	3	41	45	174	4,401	107	46	4,823
	Seldovia										11	102	1	1	115
	Seward								1		5	1,754	64		1,825
	Valdez											78			78
Aleutians East Borough	Akutan	1									15			3	19
	Cold Bay	5		2				2	23	17	7	2			59
	False Pass					2			3	3	12				20
	King Cove	27				1	31	7		85	13	7	1	1	172
	Sand Point	22		17			12	8	82		15	25	2	12	195
Aleutians West Census Area	Unalaska	141	3	68		13	8	1	14	13		73		7	340
Kodiak Island Borough	Kodiak	4,469	57	1,739	41		2		6	22	78		167	109	6,690
	Port Lions	142	2	40					1	2		153			342
Lake and Peninsula Borough	Chignik	40	1	22		2			1	9	10	94			180
Total		4,848	63	1,890	41	19	59	20	172	195	340	6,690	342	180	14,858

Table 31 - High 2020 Forecast of Passenger Volumes by Origin/Destination - AMHS

Origin	Destination	Outside SW Region				Aleutians East Borough					Aleutians West Census Area	Kodiak Island Borough		Lake and Peninsula Borough	Total
		Homer	Seldovia	Seward	Valdez	Akutan	Cold Bay	False Pass	King Cove	Sand Point	Unalaska	Kodiak	Port Lions	Chignik	
Outside SW Region	Homer						7	3	46	50	195	5,076	119	50	5,546
	Seldovia										12	118	1	1	133
	Seward								1		6	2,023	72		2,102
	Valdez											90			90
Aleutians East Borough	Akutan	2									17			3	21
	Cold Bay	6		2				2	26	19	8	2			66
	False Pass					2			3	3	13				23
	King Cove	30				1	35	7		94	15	8	1	1	193
	Sand Point	25		19			13	9	92		16	28	2	13	218
Aleutians West Census Area	Unalaska	158	3	76		15	9	1	15	14		82		8	382
Kodiak Island Borough	Kodiak	5,154	66	2,006	47		2		7	25	89		190	122	7,708
	Port Lions	159	3	45					1	3		174			385
Lake and Peninsula Borough	Chignik	44	1	24		3			1	10	10	106			198
Total		5,577	73	2,173	47	21	66	23	193	219	382	7,708	385	198	17,063